(12) UK Patent Application (19) GB (11) 2 143 662 A

(43) Application published 13 Feb 1985

(21) Application No 8330602

(22) Date of filing 16 Nov 1983

(30) Priority data

(31) 515380 (32) 18 Jul 1983 (33) US

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(51) INT CL³
G07F 7/08

(52) Domestic classification
G4V 107 130 AK
U1S 1869 G4V

(56) Documents cited
GB A 2045989
GB 1347546
GB 0959572
GB 0931239
GB 0751338
GB 0484435
EP A2 0068642

(58) Field of search
G4V

# (54) Vending machine

(57) A vending machine for dispensing and accepting relatively small boxed articles such as video cassette tapes 50 and the like. The machine is provided with a slot 16 for credit cards and is equipped to authenticate credit cards.

Advantageously a processor unit 20 controls all the function of the machine including a display monitor 12 on which operating instructions are given to the customer. A memory unit 24 is connected to the processing unit is used to store inventory and cost information.

Each article 50 positioned within the machine is identified by a code secured to the article. This code is sensed by the machine when the article 50 is returned through an appropriate slot 40.

Therefore the customer can use a credit card to obtain a selected article from the machine. If he decides to rent the article for a preselected period of time he may return it through the return slot 40. A hard copy of all the transactions is provided by a printer 38.

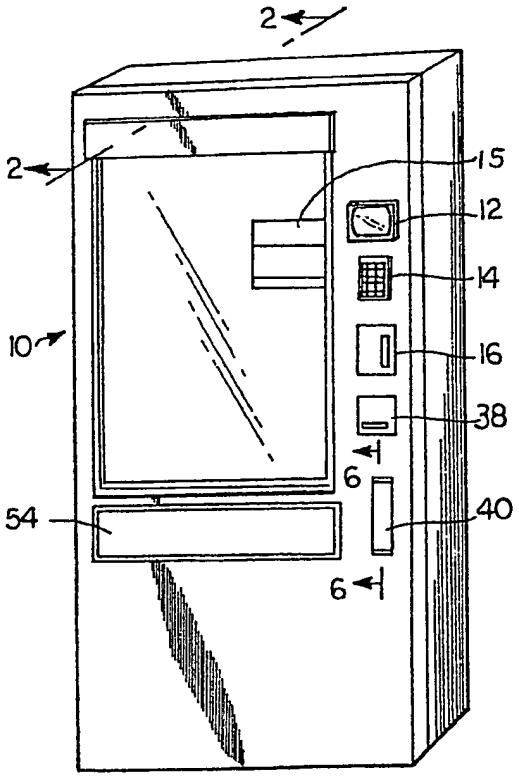



FIG. 1

GB 2 143 662 A

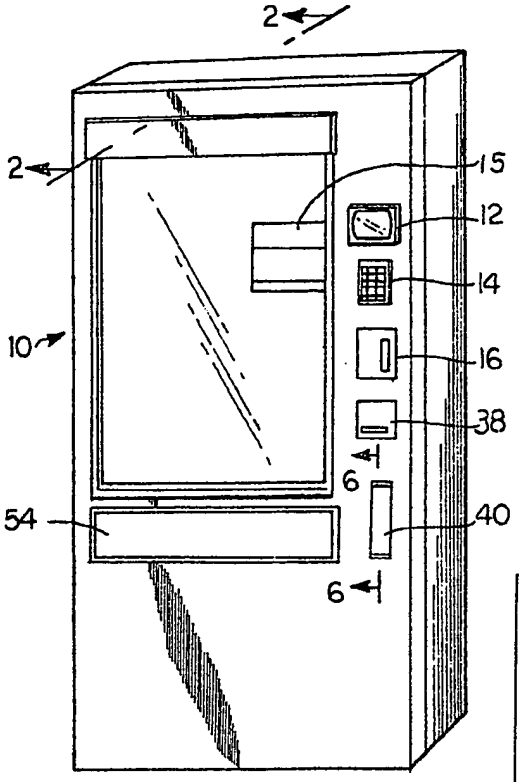



FIG. 1

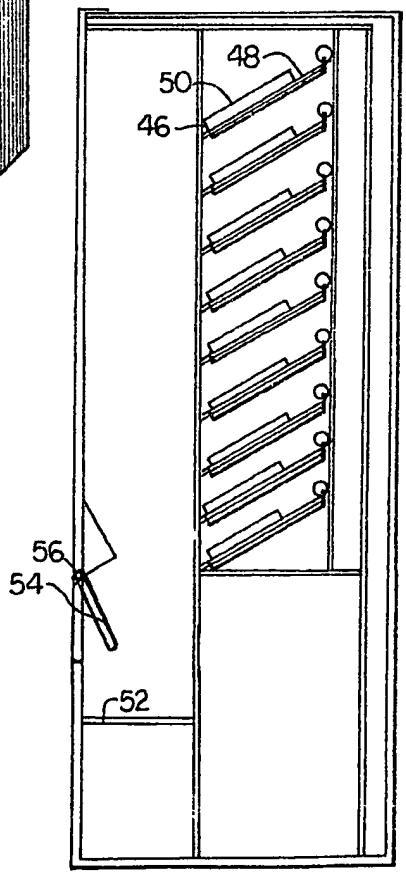



FIG. 2

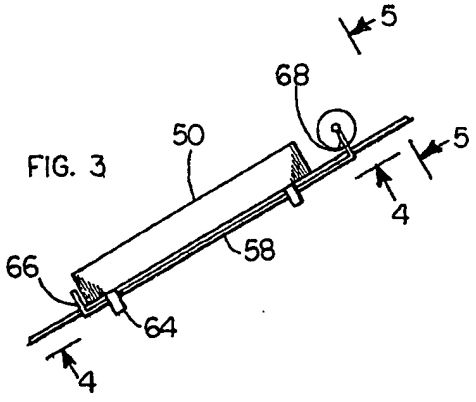



FIG. 3

FIG. 4

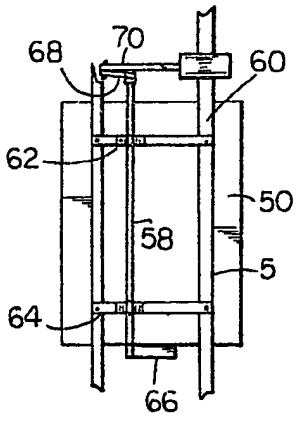
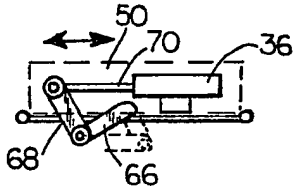



FIG. 5



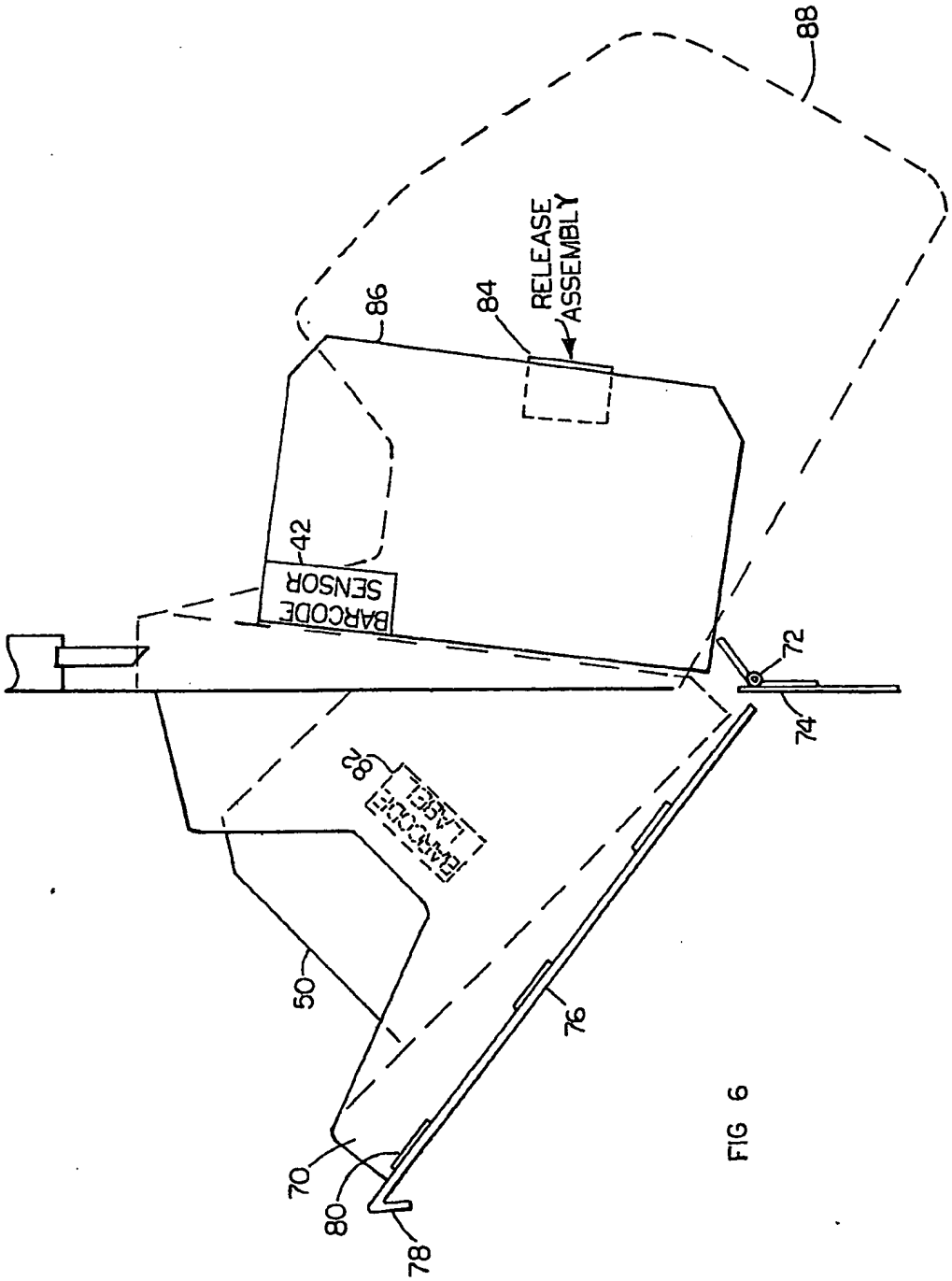

88
RELEASE ASSEMBLY
86
84
42
BARCODE SENSOR
72
74
28
BARCODE LABEL
50
76
70
80
78

FIG 6

FIG. 7

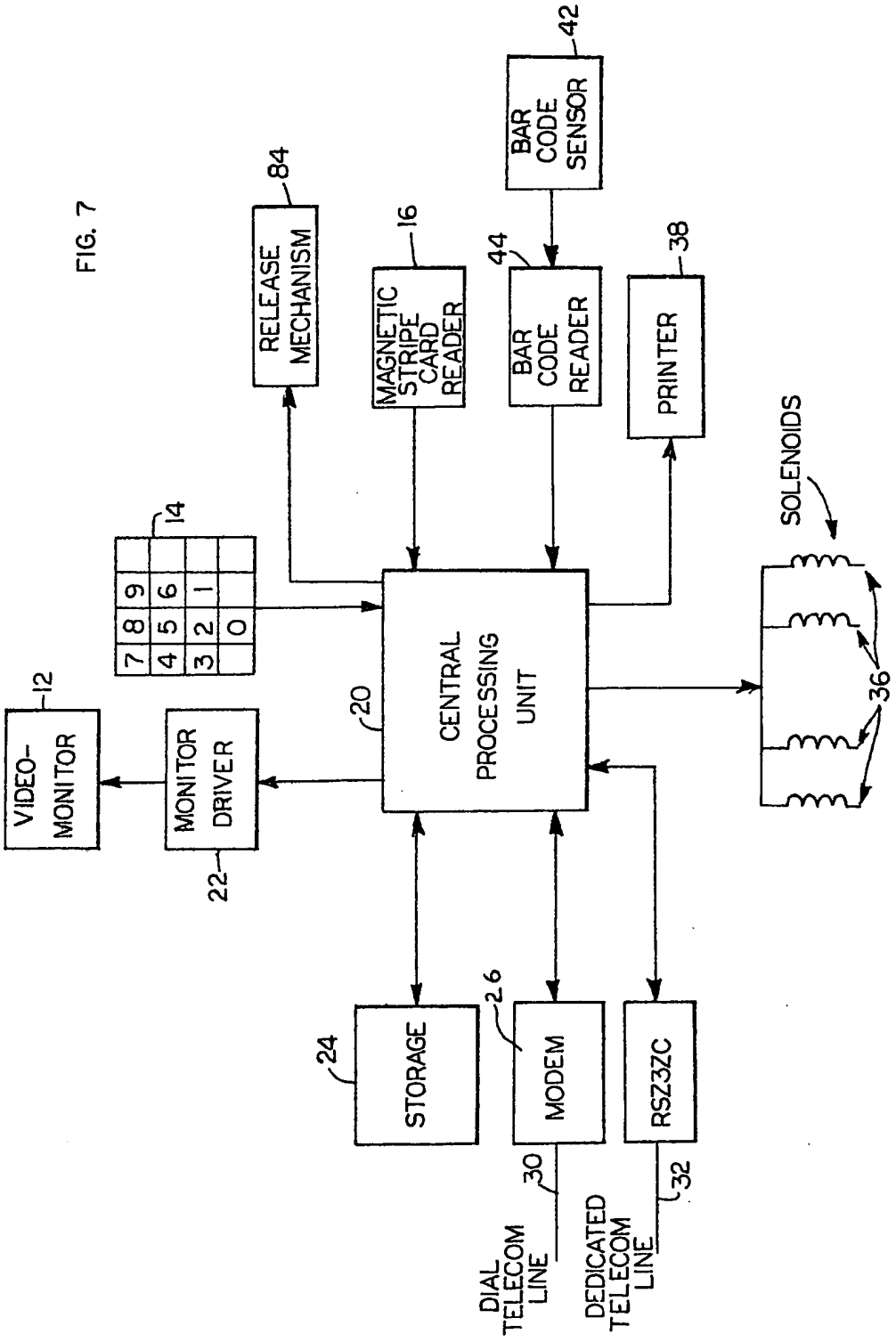

BAR CODE SENSOR
42
RELEASE MECHANISM
84
MAGNETIC STRIPE CARD READER
16
BAR CODE READER
44
PRINTER
38
SOLENOIDS
14
7 8 9
4 5 6
3 2 1
0
CENTRAL PROCESSING UNIT
20
36
VIDEO-MONITOR
12
MONITOR DRIVER
22
STORAGE
24
MODEM
26
RS232C
30
32
DIAL TELECOM LINE
DEDICATED TELECOM LINE

FIG. 8

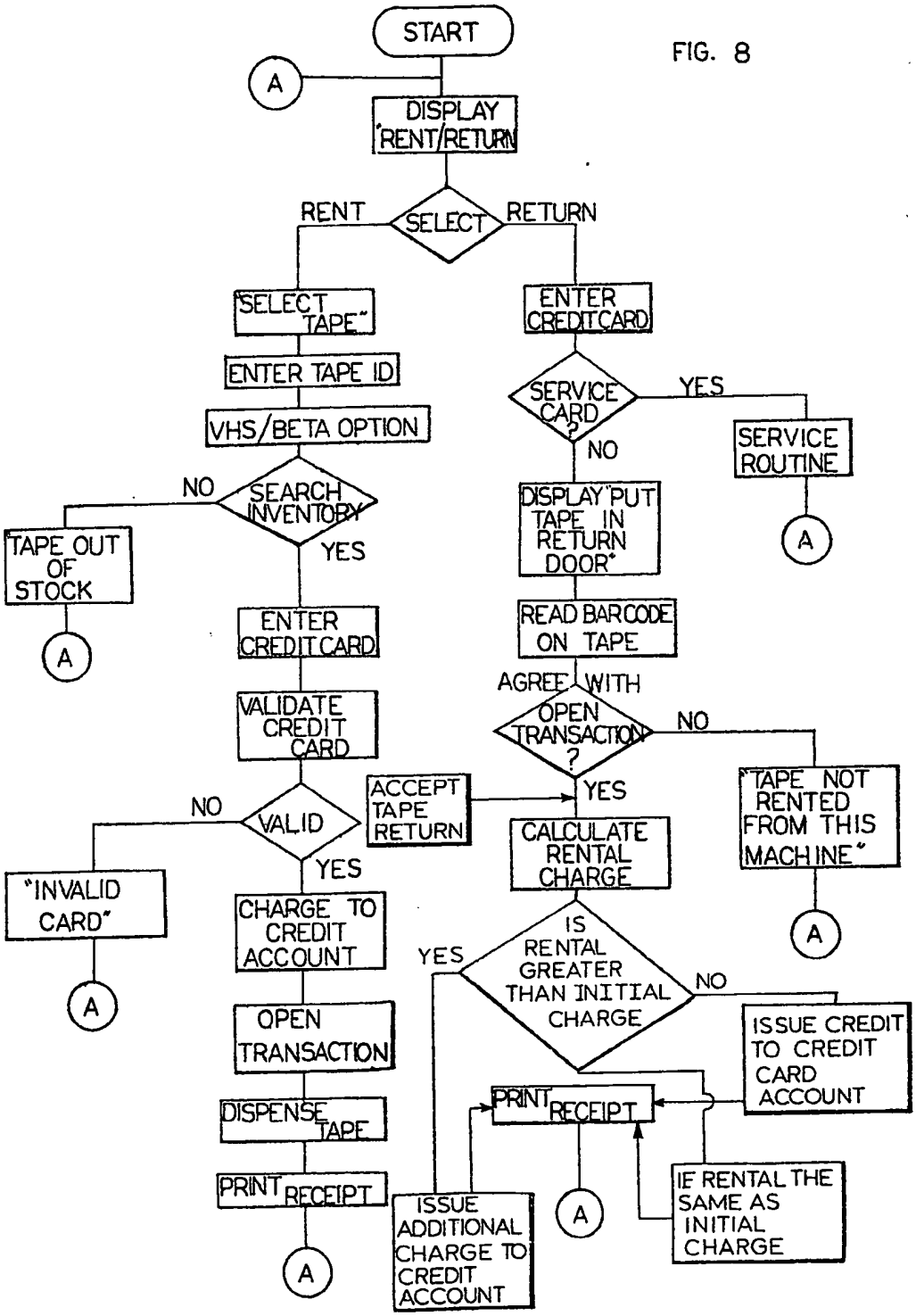
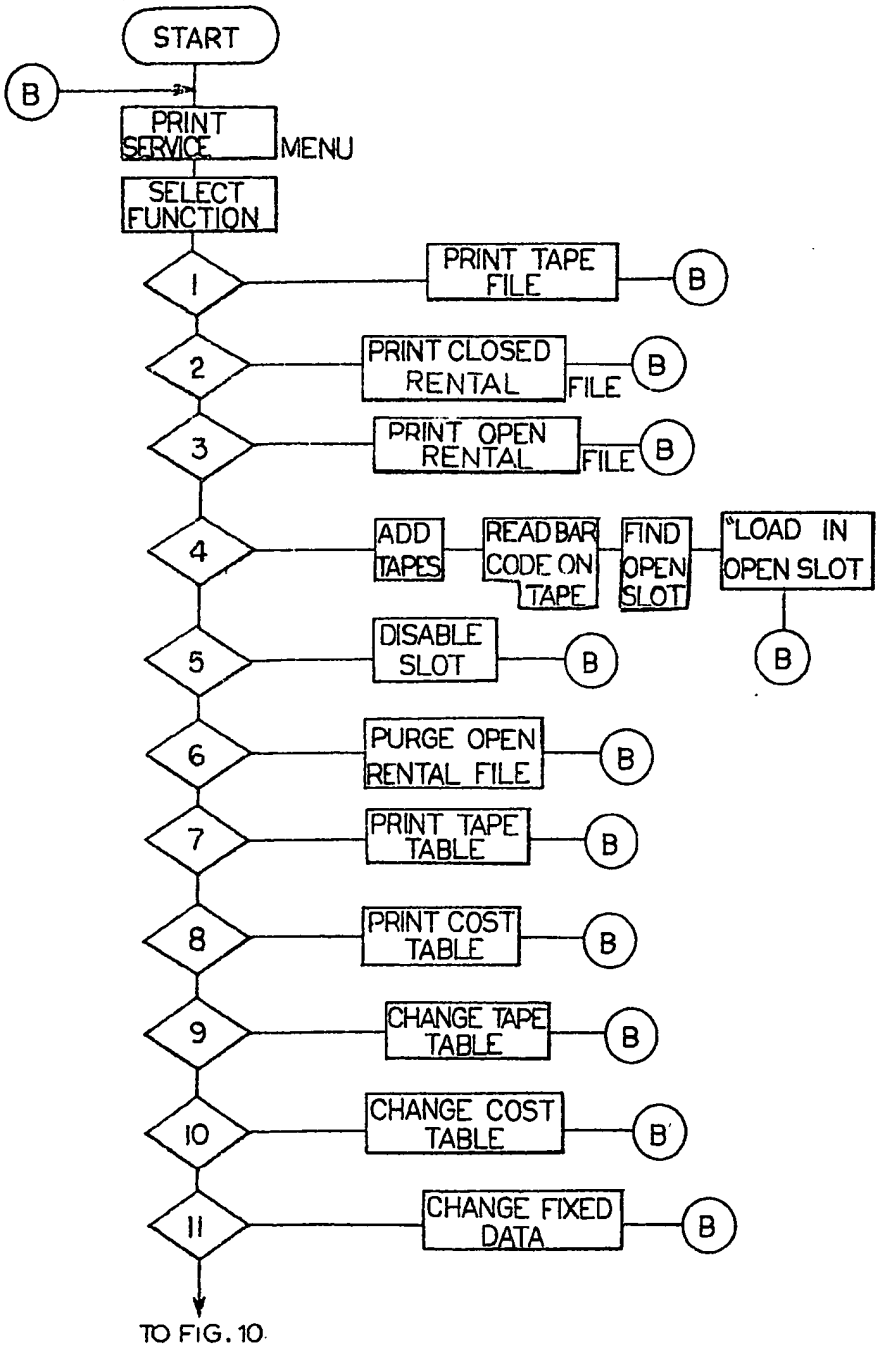
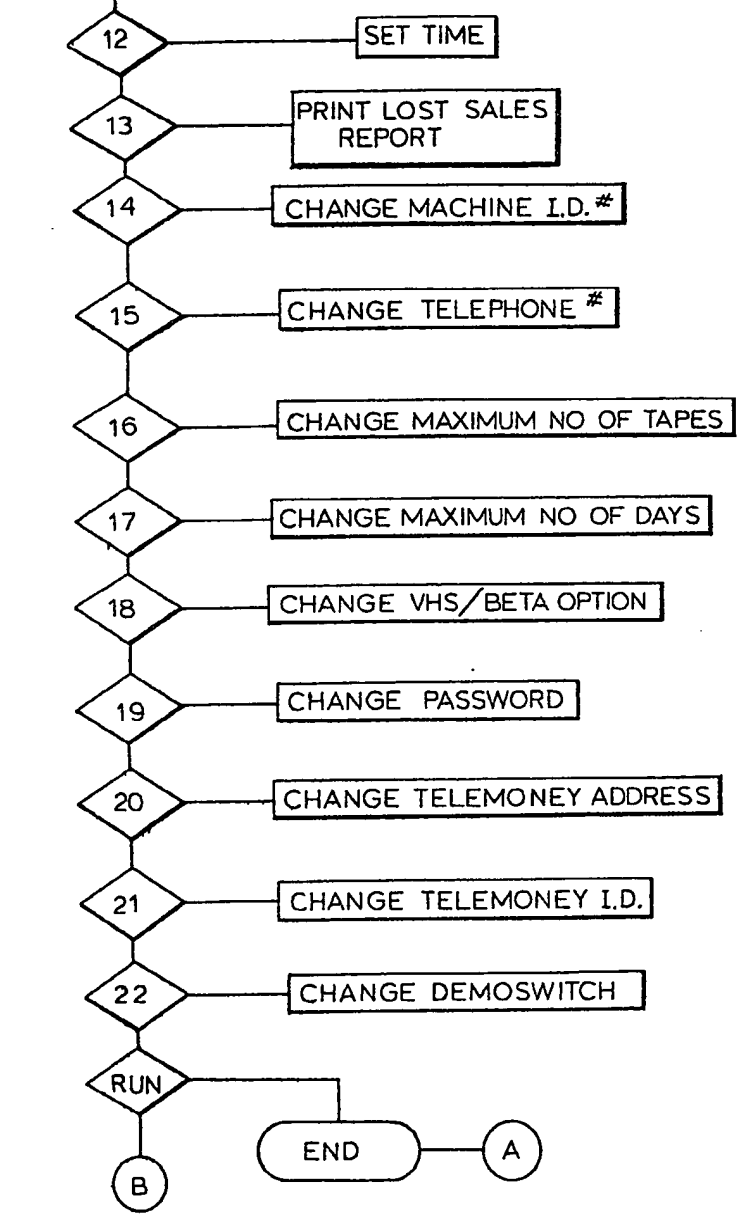

START
A
DISPLAY "RENT/RETURN"
RENT
SELECT
RETURN
"SELECT TAPE"
ENTER TAPE ID
VHS/BETA OPTION
NO
SEARCH INVENTORY
YES
TAPE OUT OF STOCK
A
ENTER CREDIT CARD
VALIDATE CREDIT CARD
NO
VALID
YES
"INVALID CARD"
A
CHARGE TO CREDIT ACCOUNT
OPEN TRANSACTION
DISPENSE TAPE
PRINT RECEIPT
A
ENTER CREDIT CARD
SERVICE CARD ?
YES
SERVICE ROUTINE
A
NO
DISPLAY "PUT TAPE IN RETURN DOOR"
READ BARCODE ON TAPE
AGREE WITH OPEN TRANSACTION ?
NO
"TAPE NOT RENTED FROM THIS MACHINE"
A
YES
ACCEPT TAPE RETURN
CALCULATE RENTAL CHARGE
IS RENTAL GREATER THAN INITIAL CHARGE
YES
NO
ISSUE CREDIT TO CREDIT CARD ACCOUNT
PRINT RECEIPT
A
IF RENTAL THE SAME AS INITIAL CHARGE
ISSUE ADDITIONAL CHARGE TO CREDIT ACCOUNT

FIG. 9


START
B
PRINT SERVICE MENU
SELECT FUNCTION
1
PRINT TAPE FILE
B
2
PRINT CLOSED RENTAL FILE
B
3
PRINT OPEN RENTAL FILE
B
4
ADD TAPES
READ BAR CODE ON TAPE
FIND OPEN SLOT
"LOAD IN OPEN SLOT
B
5
DISABLE SLOT
B
6
PURGE OPEN RENTAL FILE
B
7
PRINT TAPE TABLE
B
8
PRINT COST TABLE
B
9
CHANGE TAPE TABLE
B
10
CHANGE COST TABLE
B'
11
CHANGE FIXED DATA
B
TO FIG. 10

FROM FIG.9

FIG.10



SPECIFICATION

**Vending machine**

This invention relates to a self-contained vending machine adapted to dispense articles, especially video cassettes, either as an outright sale or on a rental basis.

Vending machines for dispensing different articles for cash are well known in the art. However inventory control on these machines had to be done manually and there was no indication of lost sales other than an "empty" sign indication corresponding to a popular item.

The advent of high speed computer-assisted communication devices brought in machines which were nothing more in reality but electronic extensions of centralized computers. Through these terminals a customer is able to complete transactions such as ordering goods, or obtaining cash from a bank account by using a credit card or other similar identifying means. Such devices can be found in United States Patents No. 4,134,537, issued January 16, 1974 and No. 3,662,343, issued May 9, 1972. Devices which dispense articles instead of cash are described by U.S. Patents No. 4,120,452 issued October 17, 1978 and No. 4,300,040 issued November 10, 1981. However because all these devices are mere extensions of a central distribution, they are suitable only for a centralized operation requiring a large investment. Furthermore if the communication link between the terminal and the central computer is interrupted, the terminal becomes useless.

An objective of the present invention is to provide a vending machine which can dispense independently articles such as video cassettes while providing inventory control.

A further objective is to provide a device which can be used for dispensing of said article independently on a rental basis.

Another objective is to provide a device which is easy to operate by the customer and the owner.

Other objectives and advantages shall be described in conjunction with the following description of the invention.

In accordance with this invention, an automatic vending machine for video cassettes and similar articles comprises an enclosure; a plurality of holding means, each one adapted to hold one of said articles and to dispense said articles when a release command is received; a selecting means for selecting an article to be dispensed; and control means connected to said selecting means and adapted to send said release command to the holding means associated with the selected article.

One form of vending machine constructed in accordance with the present invention will now be described by way of example only with reference to the accompanying drawings, in which:

*Figure 1* shows a front view of the machine;
*Figure 2* shows a sectional side view of the machine;
*Figure 3* is a side view of the cassette release mechanism;
*Figure 4* is a rear view of the mechanism of Figure 3;
*Figure 5* is a top view of the mechanism of Figure 3;
*Figure 6* is a partial sectional view of the cassette return mechanism;
*Figure 7* is an interconnection diagram of the invention;
*Figure 8* shows the decision flow chart for a normal cassette transaction; and
*Figure 9* and *Figure 10* shows the decision flow chart for servicing the subject device.

Referring to the accompanying drawings, one form of vending machine, in particular for video cassettes, according to this invention comprises an enclosure 10, as illustrated in Figure 1, which houses a storage means adapted to selectively dispense cassettes and a control means.

The various elements of the machine are best described in conjunction with its operation. All information from the machine is displayed on an electronic display unit 12. This display unit may be a 5" black and white CRT or any other similar device. In STANDBY mode this CRT displays a menu to the potential customer for selecting either the RENT or RETURN mode. This selecting may be done by activating one or more keys in a preselected manner. Preferably a single selector keypad 14 is provided for use by the customer, having ten or more keys. A membrane type keypad is particularly useful in this situation because such keypads are dust; water; and tamper-proof.

Once a customer selects the RENT mode he is instructed by the display means 12 to enter a code identifying the cassette he desires to rent. The present device can store either VHS or BETA format cassettes or both. The information on which format the customer needs is part of the code for a particular cassette.

The customer selects the correct code by consulting the master index 15 which is preferably displayed on the front of the vendor machine. Either the whole front of the machine may be used as an index, or only a portion of the front may be dedicate thereto, the rest being used for promotional materials.

After the customer enters the code of the desired cassette, a check is performed to see whether the desired cassette is in stock. If it is not then the customer is invited to make another choice. If the cassette is available the customer is instructed to insert a credit card or other means of charging the customer for rendered goods and/or services into a slot 16. Behind the slot is a magnetic stripe card reader 16 of the type well-known in the art which reads the information magnetically stored on such cards as shown in Figure 7. The information gathered by the magnetic stripe reader is sent to a central processing unit 20.

This unit is also connected to a driver 22 which acts as an interface between the central processing unit 20 and the digital display unit 12. In fact, the central processing unit gives as a clearing house for all the information changes within the vendor. Naturally it also receives the information entered by key pad 14 by the customer, including the code number for the desired cassette and determines whether the desired cassette is in fact available. In all its functions, the central processing unit makes use of a memory unit 24 in which all the required information is stored in a non-volative fashion. Preferably the memory unit comprises a magnetic disk and a compatible disk drive or a magnetic bubble memory.

Before the transaction continues, a check is performed on whether the credit card is acceptable. This is done by contacting a central information bank (not shown) where such data is electronically available. The contact can be made either through a modem 26 which transmits the identification number of the credit card, and if required, the amount of the transaction, and receives a confirming message from the central line via a standard Telephone Company communication line 30. Alternatively a dedicated line 28 may be used through an interface unit 34, such as for example an RS 232C interface. It should be emphasized that except for this credit card checking feature, all other functions are performed internally within the vendor machine. Furthermore it is possible to operate the unit exclusively internally either by using a specialized credit card which could be used only for tape rental, or by storing in the memory a list of all the numbers of all the unacceptable credit cards, and by frequently updating the list. After the credit card is verified the central processing unit 20 activates an appropriate mechanical release mechanism such as a solenoid 36 to dispense the appropriate cassette. This latter function is described in more detail further on in this disclosure.

The customer also receives a printout from printer 38 which identifies the location of the vendor machine, the tape dispensed and the terms of the rental, including the fees involved and the return dates. If the tape is not returned within a preset period of time, it is assumed that the customer wants to keep the tape and will be billed accordingly.

The video cassettes used in the vendor are preferably encoded by using an adhesive strip with a unique bar code. Once an identifying strip is attached to a given cassette, the vendor machine keeps track of a given cassette through its code.

If a customer selects the RETURN mode for the machine, he is instructed to insert his credit card in slot 16 and to put the tape into a return slot 40. A bar code sensor 42 (see Figure 7) is used to sense the identifying code of the cassette. The code is decoded by a bar code reader 44 and sent to the central processing unit 20. The processing unit checks whether there is open transaction related to the cassette. If there is no record of such transaction the cassette is returned to the customer, and the customer is informed of this event.

If there is an open transaction, i.e. the cassette has been rented from the subject vendor the central processing unit calculates the rental charge, and issues an appropriate receipt through printer 38.

At preselected time intervals the vendor machine is put into a SERVICE mode by selecting the RETURN mode and inserting a specially-coded service card into card reader 16. In this mode the service person can accomplish the functions: related to the day-to-day operation of the vendor related to net sales, inventory control, unfulfilled requests, open transactions, and net income. The service person can also add and delete cassettes from the active inventory. Advantageously, for this function he can use the bar code sensor 40 and reader 42 to identify new or removed cassettes. Information requested by the service person is displayed by display unit 12, and a permanent record is made by printer 38.

A typical decision chart for implementing the RENT, and RETURN modes is shown on Figure 8. The decision chart for implementing the SERVICE mode is shown on Figure 9. The central processor unit 20 is programmed to perform the above-described functions in the manner illustrated in Figures 8 and 9. Of course the same functions could be performed by various other steps and decision charts well-known in the art.

The elements of the invention described so far are off the shelf items available from a number of manufacturers. The following list is given as an example of parts that could be used in the present invention:

| *Element* | *Manufacturer* | *Part No.* |
|---|---|---|
| Video Monitor/Display 12 | Motorola | MD-1000-90 |
| Magnetic Stripe Card Reader 16 | Vertel | CR31 |
| Central Processing Unit 20 | Heurikon and STET | STET |
| | STET | STET |
| Video Monitor Driver 22 | Matrox | MTX 1632B |
| Storage Disk Drive | Shugart | SA801 |
| Modem 26 | Advanced Micro Devices | 7910 |
| Trip Solenoids 36 | Magnetec | MC-34A-3533-01 |
| Printer 38 | Telpar | PL20EX |
| Bar Code Sensor 42 | Intermec | 1301 |
| Bar Code Reader 44 | Intermec | 9315 |

Of course one skilled in the art could easily substitute equivalent parts.

The physical storage of the video cassettes may be done in a number of different ways. Preferably a rack 46 as shown in Figure 2 is provided inside enclosure 10. The rack comprises a plurality of tiers each tier being adapted to hold several cassettes in a row. The rack may be made out of metal rods, or similar light materials. Each tier 48 is at an angle, as shown most clearly in Figure 3 so that a cassette 50 resting thereon can slip off the tier and down into delivery chute 52. The delivery chute can be reached through a swinging access door 54. The swinging door is hinged at the top at 56 and is preferably made of a plastic transparent material so that the customer can see that the cassette 50 has been delivered, as well as for aesthetic purposes.

The mechanism for releasing the cassette on command is illustrated in Figures 3, 4 and 5. It comprises a rod or similar rigid member 58 dispersed longitudinally underneath a member 60 of the rack 46. The cassette 50 is resting on the member 60. The rod is affixed rotatably to member 60 at points 62 and 64 so that it can rotate around its own axis. The rod is terminated with a lower arm 66 and an upper arm 68 each arm being bent at approximately 90° respect to the rod. The lower arm 66 normally extends beyond member 60 generally upwards from rod 58 so that it forms the lowest rest point for the cassette 50. Thus is the rod is rotated so that arm 66 moves away from the cassette, the cassette 50 is free to slip of from the rack 60.

Also on member 60, preferably above cassette 50 is a solenoid 36, which is one of the central processor unit-activated solenoids shown in Figure 7. The solenoid is electrically connected to the central processor unit and has a plunger 70 which moves axially to the left in Figure 4 as the solenoid 36 is activated. The plunger is pivotally connected to upper arm 68 of rod 58. Therefore when the solenoid 36 is activated, plunger 70 moves right in the direction shown by the arrow, the rod 58 rotates clockwise, and the lower arm 66 moves downward accordingly releasing the cassette 50 associated with the solenoid. Thus the release of the cassette into the delivery chute 52 on command from the central processing unit 20 is effectuated.

As shown in Figure 6, the return mechanism 40 comprises a tray 70 pivotally mounted at its lower portion 72 to the front panel 74 of the vendor so that when it is closed, the front face 76 of the tray is flush with the front panel 74. At the top the front face 78 ends with fingergrip-type handle 78 which can be used to turn or pivot tray 70 in and out. Tray 70 is adapted to hold cassette 50 preferably on its edge as shown in Figure 6. Instructions for inserting the cassette into the tray can be mounted on the inside. Surface 80 of the front face 76 or adjacent to it.

As previously described each cassette 50 is provided with an identifying label 82 which is electrically or optically encoded to provide identifying information about the respective cassette. After the cassette is inserted into the tray, the tray is pivoted back into the main body of the vendor. As the tray is being pivoted, the label of the cassette passes by a code sensor such as a bar code sensor 42. As the tray reaches the flush position, the identifying code of the cassette is sent to the central processor 20. If the cassette matches an open transaction the central processor operates a release mechanism 84 which allows a rear portion 86 to swing back and release the cassette into a storage bin 88.

During servicing the operator gains access to the storage bin and removes the returned tapes. He may take them away or he may reload them together with new tapes into the vendor during the vendor machine servicing routine. For example, if during servicing (see flow chart on Figures 9 and 10), the operator decides at decision block 4 to add new tapes to the machine's inventory he will be instructed to insert the first new tape into the return slot 40. The code of the tape is then read by code bar sensor 42 and reader 44 and this is transmitted to the central processor 20. The central processor, which keeps track of all the empty cassette locations, enters the identification of the cassette, assigns an empty location to the cassette and instructs the operator to remove the tape from the return slot and placed at the designated location. Now the operator is free to insert another new tape.

In summary, the vending machine has three modes of operation: RENT, RETURN and SERVICE. A potential customer initially has the option of selecting the RENT or RETURN modes. In the RENT mode, on request from the central processor, the customer enters the identification number of the desired tape and its format (BETA or VHS). The processor checks its inventory to determine whether the desired tape is available. If the tape is available, the customer is requested to provide a credit card. After the credit card is validated a hard copy of the transaction is provided to the customer, and the appropriate solenoid is activated to cause the cassette to drop into the delivery chute.

If the RETURN mode is selected, the customer is requested to insert his credit card and the cassette into the respective slots. If the cassette is recognized as an open transaction i.e. a cassette involved in a rental, the cassette is dropped into a storage bin, the rental charge is calculated, and a hard copy of the finalized transaction is provided to the customer. If the cassette is not recognized it is returned to the customer.

The SERVICE mode is initialized by an operator by first selecting the RETURN mode and then by inserting a special service card into the card reader. Once the special service card is recognized a special service menu is displayed on the display screen and the service operations involving sales information, inventory control, rate changes, replacement of cassettes may be performed.

The subject vending machine was described in conjunction with the renting and/or sale of prerecorded video cassettes. However it's obvious that it may be used for the distribution of various other boxed

articles with little or no modifications such as video games, computer software, paperbacks and blank tapes. Furthermore numerous modifications could be made in the subject device by one skilled in the art with out departing from the scope of the invention as defined in the appended claims.

CLAIMS

1. A vending machine for vending boxed articles comprising: an enclosure; a plurality of holding means, each one adapted to hold one of said articles and to dispense said articles when a release command is received; a selecting means for selecting an article to be dispensed; and control means connected to said selecting means and adapted to send said release command to the holding means associated with the selected article.

2. A vending machine as claimed in claim 1, comprising means for accepting a customer identification means which identification means being provided to charge the customer for the selected article.

3. A vending machine as claimed in claim 2, comprising means for authenticating said identification means.

4. A vending machine as claimed in claim 3, wherein said authenticating means comprises means for contacting a remote data bank said data bank containing data identifying unacceptable identification means.

5. A vending machine as claimed in any one of claims 1 to 5, comprising return means for accepting previously dispensed articles.

6. A vending machine as claimed in claim 5, wherein all articles held and dispensed by said machine carry an identifying code, and wherein said return means comprises means for recognizing a returned article by its identifying code.

7. A vending machine as claimed in any one of claims 1 to 6, wherein each one of said holding means comprises a solenoid adapted to release the article associated with its holding means when it receives said release command.

8. A vending machine as claimed in claim 6, wherein each one of said holding means comprises a tilted rack on which the respective article is disposed, and a rod having a first end engaging said article and a second end is adapted to be pivoted by said solenoid around said rod.

9. A vending machine as claimed in claim 8, wherein said rod is rotatably secured to said rack, and said first end disengages from said article when said second end is pivoted by said solenoid, whereby the article slips off from said rack.

10. A vending machine for dispensing boxed articles comprising: a processing unit; a display means operatively controlled by said processing unit; data entry means for entering information regarding a selected article to be dispensed, said processing unit being adapted to check whether said selected article is available; customer identification means for identifying the customer requesting an article; and dispensing means controlled by said processing unit and adapted to dispense the article selected by the customer.

11. A vending machine as claimed in claim 10, wherein said processing unit is adapted to display operating instruction on said display means.

12. A vending machine as claimed in claim 10 or claim 11, wherein said processing unit comprises arithmetic manipulation means and memory means for storing information regarding article currently available in the machine and their cost.

13. A vending machine as claimed in claim 12, wherein said processing unit is adapted to calculate the cost of buying or renting each article and to display said cost for a selected article on said display means.

14. A vending machine as claimed in claim 13, comprising printing means for printing the cost for the select article.

15. A vending machine as claimed in any one of claims 10 to 14, comprising authentication means for authenticating said customer identification means.

16. A vending machine as claimed in claim 15, wherein said authentication means comprises means for contacting a remote data bank adapted to identify invalid customer identification means.

17. A vending machine as claimed in any one of claims 10 to 16, wherein each article disposed and dispensed by said vending article is identified by a code secured to said article, and said processing unit is adapted to keep track of each article through said code.

18. A vending machine as claimed in claim 17, comprising a return slot for accepting returned articles.

19. A vending machine as claimed in claim 18, wherein said return slot comprises means for sensing the code of the returned article, said sensing means being adapted to transmit said code to the processing unit.

20. A vending machine comprising: means for holding articles disposed therein; means for accepting an order from a customer for a selected article; means for identifying the customer; means for identifying the selected articles as one of the articles disposed on said holding means; and means for dispensing the selected article.

21. A vending machine as claimed in claim 20, comprising means for accepting article whereby said

vending is machine adapted for renting the article contained therein.

22. A vending machine substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

Printed in the UK for HMSO, D8818935, 12/84, 7102.
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